

### ABSTRACT

Methods and apparatus, including computer program products, for filtering an image including a plurality of pixels. A forward kernel centered at a first pixel in the image is received. The forward kernel assigns forward weights to pixels in a neighborhood surrounding the first pixel. A backward kernel centered at a second pixel within the neighborhood surrounding the first pixel is specified based on a local attribute of the image at the second pixel. The backward kernel assigns backward weights to pixels in a neighborhood surrounding the second pixel. A convolution weight of the second pixel is determined based on the backward kernel and the forward kernel. The convolution weight and a pixel value of the second pixel are used to generate a new value of the first pixel.

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